

METHOD FOR PRODUCING CLEAN ENERGY FROM COAL

Abstract

A method for producing clean energy from coal by feeding the coal in a reactor which is sealed to the atmosphere and moving the coal in the reactor while injecting oxygen to combust a portion of the coal in a substoichiometric mode to devolatilize the coal and yield a pressurized hydrogen rich raw gas which contains coal-derived cancer causing distillates and hydrocarbons together with a hot char. The distillates and the hydrocarbons are cracked to result in a cracked gas of essentially $2H_2$ and $1CO$ which after desulfurization becomes an ideal synthesis gas that can be synthesized to a liquid fuel for heating and transportation as an alternate to petroleum.

The hot char is gasified in an air blown gasifier to produce a fuel gas and a molten slag which are jointly directed out of the gasifier through a common port which is maintained open for the free flow of both. The fuel gas and the molten slag separate from each other by flowing both gas and slag through a molten bath in a submerged manner in order to effectively scrub the fuel gas in the molten bath while it bubbles out of the bath.

After separation the fuel gas is treated for sulfur removal and is in condition for use as an efficient gas turbine fuel for power generation by virtue of its mass, while producing very low NO_x emissions when combusted. This fuel gas can also be used for raising steam and for clean burning in industrial heating. The method is capable of making coke and/or activated carbon.